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Medical evacuations and absences from work in offshore personnel employed in the oil and gas industry

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Abstract

Background: Absenteeism and medical evacuation (medevac) has a significant impact on offshore operations, and individual health and wellbeing.

Objectives: The research aimed to estimate the prevalence of medevac and work absences due to health-related problems in global offshore workers.

Design: A cross-sectional survey utilising an electronic questionnaire, comprising closed questions, was developed to identify the prevalence of medevac and absenteeism, pre-tested with an expert panel and piloted (n=9). Global oil and gas industry employees (n=776) attending a 1-day course at a training facility in Aberdeen, Scotland, were recruited on a daily basis. Consenting participants received an invitation email containing a link to an online questionnaire.

Results: A total of 352 questionnaires were returned (45.4% response rate). One fifth (n=70, 20.1%) of respondents stated that, over the course of their career, they were unable to travel offshore for work due to their health-related problems. Absence was primarily due to: injury (n=30, 39.0%); short-term illness (n=19, 24.7%), or long-term illness (n=4, 5.2%). Over the course of their offshore careers, approximately one tenth (n=42, 12.1%) had required medevac of which most resulted from either injury (n=15, 34.1%) or short/long-term illness (n=14, 31.8%). A significant association between absenteeism and medical evacuation was identified ($p=0.002$).

Conclusions: The findings support the need for further preventative measures to be taken as a means of reducing the incidence of medevacs and absences in the offshore industry. The development of interventions that enable offshore workers to maintain their own health and wellbeing may be of benefit.

Keywords: medevac; offshore workers; occupational health

Introduction

The oil and gas industry depends on a skilled workforce adept in coping with the hazardous demands of an offshore environment.(1) Offshore installations typically operate on a minimum staffing policy with no back-up crew on-board to cover absences; reducing illness-related absences are therefore critical.(2) Further, whilst such installations are typically manned by a qualified remote healthcare practitioner, treatment may be limited to minor ailments and injuries due to constraints in space on-board installations and the lack of medical facilities and supplies. (2-4) Hence, medical emergencies typically require medical evacuation (medevac) either directly or indirectly. Toner et al (2017) define medevac as the “*evacuation of a sick or injured person from a remote environment to a place of safety for the provision of appropriate medical attention*” and includes both “*routine medevac*” (i.e., via the operating company helicopter service) and “*emergency medevac*” (i.e., via search and rescue (SAR) helicopter or boat) (5). Emergency medevacs are particularly costly and may be dangerous when executed during extreme weather. Relatedly, any delays in evacuation may adversely affect an individual’s health and wellbeing.(4)

Yet despite the risks and financial burden associated with medevacs, few studies have focused on the epidemiology of injuries and illnesses arising from working on remote oil and gas installations that result in medevac. Moreover, of those studies that have been conducted in this domain, most pertain to the North Sea sector.(6) What is evident from the extant literature is the significant changes in the predominant cause of medevacs over time.(4) Pre-1980, there were substantially more injuries than illnesses resulting in medevacs. From 1976-1984, a retrospective analysis of offshore medevacs in the United Kingdom (UK) reported 2162 evacuations: the majority of which were injury-related and did not require use of a chartered flight. Whilst the largest proportion of medevacs were due to injury, there was also a sharp increase in the rate of illness from 1980 to 1981 (25% to 40%). Based on a working diagnosis using the ninth revision of the *International Classification of Diseases* (ICD-9), most medevacs resulted from illnesses associated with the digestive system (n=239) with approximately half due to dental problems. In respect of medevacs arising from injury, suspected fractures were responsible for about one third of medevacs whereas injuries of the hands and eye conditions accounted for a quarter of medevacs. As the age of the evacuee increased the proportion of evacuations for injury decreased and that for illness increased. The mean ages for evacuation

for illness and injury was 34.4 years and 28.3 years respectively. Those aged over 45 years required fewer medevacs.(7)

A subsequent review of 3,979 medevacs commissioned by the Health & Safety Executive (HSE) in the same geographical location from 1987 to 1992 endorsed the trend with a continual increase in the illnesses accounting for medevacs (HSE, 1997). By 1992, 65% of medevac cases were attributed to illness with gastrointestinal and dental problems combined as the major cause. In contrast, there were only 3% of medevac cases recorded for cardiovascular-related illness and 4% pertaining to mental health disorders. The HSE review reported a similar pattern for the injuries requiring medevacs from UK offshore installations to that of Norman et al %) (7) as did a 1996 study of Shell Expro installations in the North Sea (8). In 2011, 70% of the 226 medevacs recorded by Statoil were due to medical conditions, with cardiovascular-related conditions being the most common (9).

Fewer studies on medevacs in the oil and gas industry have focused out with the UK; those that have been undertaken pertain predominantly to Brazil (Freitas et al, 2001; Souza et al, 2002; de Souza et al, 2003). A notable exception is the more recent retrospective review conducted from 2008-2012 based on 130 medevacs of Shell International employees [i.e. expatriate employees (EEs) and frequent business travellers (FBTs)]. Most medevacs were associated with digestive or traumatic diagnoses. Injury was a notably less prevalent cause of medevac than illness.(5) This finding concurs with a retrospective review of data from 102 offshore installations in the US Gulf Coast over the same time period.(6) On average, 77% of medevacs identified were for non-occupational injury or illness, the majority of which were due to cardiovascular conditions, abdominal pain and neurological conditions/seizures. Trauma and amputations accounted for the majority of medevacs associated with occupational-related injuries. Older workers were more likely to experience medevacs because of medical conditions than younger workers whilst the reverse was found for occupational injuries. This age-related association was similarly highlighted in an earlier UK report of offshore injury, ill health and incident statistics for 2011-2012 whereby the majority of injuries sustained affected offshore workers aged 25 to 49 years.(10)

Reasons for the change in the pattern of medical emergencies over time have been attributed to a variety of factors including variations in the health status of the offshore workforce. The rise in the number of medevac cases due to illness may reflect the rise in chronic conditions

due to an increasingly obese workforce.(11) Despite the fact that those employed within the oil and gas industry are a fitness screened workforce, a number of reports have highlighted epidemiological trends of increasing obesity. Between 1985 and 2014, the average weight of men working in the offshore oil and gas industry in the UK Continental shelf rose by 20% (Oil & Gas UK, 2014). Findings from a recent 3D scanning study bear further testimony of increased obesity and adiposity in offshore workers (12,13); a burgeoning problem encountered in countries worldwide and one which is associated with a rising prevalence of diabetes mellitus, related cardiovascular pathologies and other chronic pathologies.(14)

The change in the health status of the offshore workforce is of particular concern within the context of the fact that the offshore oil and gas industry and associated maritime activities increasingly operate in remote and hostile locations worldwide. Such locations present specific challenges in terms of medical emergency response (MER) due to their geographical remoteness from secondary or tertiary medical care and the risk of substantial delays imposed by inclement weather.(4) Costs relating to medevacs therefore represent a significant and rising financial burden to the industry. To undertake medevacs even from less remote locations is expensive.

For example, according to Thibodaux et al (6), the cost of medevac from oil and gas installations within the Gulf of Mexico based on a 2 to 3 hour flight time was estimated as ranging from \$44,333 to \$54,167 (i.e., \$19,700 per hour) with an average cost of \$49,250. Calculations based on the data analysed over the 5-year study period suggested that the average cost for medevacs due to cardiovascular disease alone was \$8.8 million. It is important to bear in mind however that these figures reflect the fact that 98.5% of medevacs in this region were undertaken by commercial helicopter companies with the remainder relying on the assistance from the US Coast Guard. In other contexts, therefore, medevac-related costs are likely to vary considerably depending on the location, and the procedure and criteria used by specific companies to decide on the need for a medevac. Typically, this decision is not solely based on the offshore worker's medical condition but will also take into consideration other factors such as logistics, weather forecast and strategic motivations. Furthermore, this financial burden does not take into account the costs associated with: health and safety risk to all parties concerned; onshore medical care; lost productivity, and providing a replacement to undertake the work.(6)

Despite the additional costs associated with lost productivity arising from medevacs, there is a paucity of literature on the prevalence of absenteeism within the industry. Previous studies have, for example, focused on the association between job strain and absenteeism.(15) Given the significant impact that absenteeism and medevacs may have on offshore operations, and individual health and wellbeing, further research is required. Specifically, in relation to understanding the impact associated with both the inability of individuals to travel offshore to commence work on an installation as well as those individuals who return prematurely onshore by virtue of experiencing a health-related problem. In the absence of a centralised global database which records the prevalence of medevacs and absenteeism in the offshore workforce, a cross-sectional study was warranted. The research aimed to estimate the prevalence of medevac and work absences due to health-related problems in global offshore workers, and to establish if there was any association between these variables.

Methods

Design

A cross-sectional survey using an electronic data collection tool.

Questionnaire development

The final questionnaire contained questions to determine the prevalence of absences and medevac within a sample of offshore workers. Study participants were asked two screening questions to determine if they had, at any point, been unable to travel offshore due to their health-related problems and if they had ever required medevac from an offshore platform. Those who answered that they had either been absent or experienced medevac were asked four subsequent closed-questions to determine the reasons for which and, in the case of medevac, the number of times they had been evacuated and if they had required an emergency evacuation (e.g. a flight that was specifically chartered for them). The findings presented in this paper are a sub-set of a larger study which has been reported elsewhere(16).

Participants

Global oil and gas industry employees (n=776) attending a 1-day Further Offshore Emergency Training (FOET) course at a training facility in Aberdeen were recruited on a daily basis by the researcher over a 16-week period (October 2014 to March 2015). The feasibility of the proposed recruitment methods was established via a pilot study (n=9). As no changes were

made post-pilot participants' data were included in the full data set. The FOET is a 1-day refresher course and successful completion is a prerequisite of maintaining certification to operate offshore in the United Kingdom Continental Shelf (UKCS). A maximum of 16 delegates attended the FOET course which ran daily. Only those with prior experience of working in an offshore environment that required an overnight stay were recruited.

Patient and public involvement

To enhance face and content validity, eight experts in health services research, offshore health and self-care were identified by the research team and invited by the researcher to participate in an expert panel review of the questionnaire.

Data collection

The researcher provided a brief of the survey to delegates attending the FOET and those interested (n=657) in receiving a link to the questionnaire were asked to complete a paper contact form with details of their name and email address. Consenting participants received an invitation email containing a link to an online questionnaire around 24 hours after the initial briefing. A deadline date was set for two weeks with two reminder emails sent at fortnightly intervals. Respondents were permitted to complete the questionnaire anonymously and were provided with the opportunity to be entered into a prize draw for a £50 retail voucher.

Data analysis

Data were analysed using the IBM Statistical Analysis Software Package – Statistical Package for the Social Sciences Version 21. Descriptive statistics were utilised with means and standard deviations where distributions were normal, and medians and interquartile ranges, when the distribution was skewed (identified as being such due to non-significant Komogorov-Smirnov alpha values). Chi square analysis was used to determine associations between absenteeism and medevac variables. Mann-Whitney U tests were used to identify associations between age, absenteeism and medevac variables. P values ≤ 0.05 were considered statistically significant. No additional data available.

Ethical approval

Ethical approval was granted by the University School Research Ethics Committee. The training site granted approval to access FOET delegates. All participants provided informed consent.

Results

Response rates

A total of 352 questionnaires were returned (45.4% response rate). Respondents were aged 22-64 years (*Mean* = 42.9, *SD.* = 10.1) and the majority were male (n=335, 96.3%) and either married or in a civil partnership (n=258, 74.1%).

Absenteeism

One fifth (n=70, 20.1%) of respondents stated that, over the course of their offshore career, they were unable to travel offshore to commence work due to health-related problems. Absence was primarily due to injury (n=30, 39.0%) or illness (short-term illness, n=19, 24.7%; long-term illness, n=4, 5.2%) (Table 1).

Medical evacuation

Approximately one tenth (n=42, 12.1%) required medevac of which most resulted from injury (n=15, 34.1%) or short-term illness (n=14, 31.8%). Fourteen of these cases (34.1%) experienced an emergency medevac. The majority reported medevac on one occasion (n=34, 85.0%). Six (13.6%), however, required medevac on two or more occasions (Table 2).

Association between absenteeism due to health and medical evacuation

Chi square analysis identified a significant association between absenteeism due to health-related problems and medevac, $\chi^2 (1) = 9.87$, $p = 0.002$. A higher percentage of those who had been unable to travel offshore to commence work had experienced medevac from an offshore installation (n=16, 23.2%) than those who had never been unable to travel offshore to commence work (n=26, 9.4%).

Association between age, absenteeism and medical evacuation

Mann-Whitney U tests identified non-significant associations between both absenteeism and medical evacuation and age. The median age of those who had never been absent (*Median* = 42, *IQR* = 17) was not significantly different from those who had been (*Median* = 42.0, *IQR* = 18); $U = 9157.0$, $p = 0.721$. Similarly, the median age of those who had received medevac (*Median* = 46.0, *IQR* = 15) was not significantly different to those who had never received medevac (*Median* = 42.0, *IQR* = 17); $U = 5179.5$, $p = 0.101$.

Discussion

The principal findings of this study suggested that, due to health-related problems, the prevalence of medevac was 12.1% compared with 20.1% for absenteeism. Furthermore, both illness and injury were most commonly associated with medevac. Similarly, absenteeism from travelling offshore due to health-related problems was more likely to be due to illness than injury. Prior absenteeism from travelling offshore due to health-related problems was significantly associated with experiencing a medevac.

Interpretation

Mitigation or amelioration of medevacs to reduce related absences are critical to the offshore industry in terms of decreasing economic burden, sustaining production and improving individual health and wellbeing. Medevacs are costly and may prove dangerous in hazardous weather conditions thereby posing an increased risk to an individual's health particularly if medevacs are delayed. (4) Accordingly, ensuring that the incidence of medevacs is reduced is of significant importance to the industry.

The increased likelihood of illness, rather than injury, leading to medevac within offshore workers appears to represent an increasing trend.(4,5) The results of our survey present a divergent pattern to previous ones, in that the majority of both medevacs and absences were attributable to injury. This may be somewhat due to the nature of questioning used in this study; whereby offshore workers were required to report absences or medevacs at any point during their offshore careers rather than within a more recent timeframe. Although Toner et al (5) recorded data on medevacs from 2008-12 thereby providing a more recent estimate, the results from our study enable a comparison over a much larger time period, perhaps in some cases dating back decades.

Relatedly, this may also reflect changes in attitudes towards remote occupational health provision, health and safety legislation and "duty of care", the impact of environmental protection requirements and technology. All of these factors have heightened awareness of the need to assess and to control hazards and health risks as a means of prevention and to mitigate their impact. However, it is important to note that this is not universal. For example, the extent of health and safety legislation varies considerably subject to the country in which an oil and gas company is operating; a circumstance which impacts on requirements relating to the levels of medical equipment and supplies and the number and competencies of medical personnel.(4)

By virtue of the disparity of remote healthcare requirements worldwide, industry groups have produced non mandatory guidance that seeks to establish requirements for managing a medical emergency in field activities and for specifying the resources to implement a Medical Emergency Response Plan (MERP) such as that produced by the Health Subcommittee of the International Association of Oil and Gas Producers (OGP) published Report No: 343 entitled “*Managing Health for Field Operations in Oil and Gas Activities*”.(17)

Whilst the findings of the study identified injury as being the most prominent reason for medevac and absenteeism, the rates attributable to illness were almost equal in both cases. This finding is important in the context of self-care, defined as “...*the ability of individuals, families and communities to promote health, prevent disease, and maintain health and to cope with illness and disability with or without the support of a health-care provider*”.(18) Engagement in self-care may enable individuals to manage both their health and long-term health conditions. (19) Previous mixed methods research seeking to explore self-care in the offshore workforce has highlighted the need for implementation of a self-care intervention. (16,20) Due to the high prevalence of medevacs and absenteeism attributed to illness, it further endorses the need for the development of such an intervention within this context.

Previous qualitative research exploring sickness presence in the offshore industry reported that offshore workers will often present for work whilst offshore despite experiencing ill health. In addition, participants stated that, although they are permitted to delay their shift schedule in the event of being unable to travel offshore, their preference would be to travel on their scheduled day rather than commence work at a later date.(21) These findings demonstrate the complexity of both absenteeism and sickness presence at work. Accordingly, it may be beneficial for future studies to identify the prevalence of sickness presence within the offshore workforce. Such an exploration may be particularly warranted given that offshore installations are safety critical environments which require high levels of situational awareness.(22) Further, it would be pertinent to determine if there was any association between sickness presence and increased likelihood of medevac.

Reasons for the association between prior absenteeism from travelling offshore due to health-related problems and the prevalence of medevac were not possible to ascertain in this study. However, previous research has identified a strong to moderate link between a pre-existing medical condition and medevac although, notably, this was only evident in 9% of the

sample.(5) To the authors' knowledge, there has been limited research published on absenteeism within the offshore industry. However, a cross-sectional study on stress and strain in offshore workers identified that strain, defined as issues with sleeping and digestion, was associated with absenteeism.(15) By virtue of the complex interplay of factors associated with absenteeism, future research in this area within the offshore industry may be beneficial in providing a clearer understanding of how these factors are inter-related. For example, in respect of exploring the association between pre-existing medical conditions and a diagnosis that lead to medevac.

Strengths and limitations

The research further explores the prevalence of medevac in the offshore industry and absenteeism due to health-related problems within the workforce. A strength of the research method and design was the manner in which respondents were recruited since the training facility used as a recruitment site enrolls large numbers of offshore workers on a daily basis. Hence, the sample represented a broad demography in terms of age, occupational status and geographical location. A limitation of the study may relate to the self-report data collected, which may be liable to recall, reporting and response bias. However, in the absence of a centralised global database which records the prevalence of medevac and absenteeism in the offshore workforce, the rationale for conducting a cross-sectional study was justified. A further limitation may relate to potential for non-response bias. Due to the nature of recruitment and survey software utilised and for associated ethical reasons, however, it was not possible to collect data on those who did not respond.

Conclusion

The findings support the need for further preventative measures to be taken as a means of reducing the incidence of medevacs and absences in the offshore industry. To this end, the development of interventions that enable offshore workers to maintain their own health and wellbeing and to promote engagement in self-care within the workforce may be of benefit. Maintenance of health and wellbeing in remote and rural geographical areas is a critical factor in ensuring that these communities are both resilient and empowered.

Author Contributions

All authors made substantial contributions to the conception and design of the work, analysis and interpretation of the work. All were involved in drafting and revising, approved the final version for publication and agree to be accountable for all aspects of the work.

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Statement of interests

The authors have no conflicts of interest to declare.

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Tables

Table 1. Absenteeism in offshore workers

Measure	n (%)
<i>Absent from work due to health</i>	
Yes	70 (20.1)
No	278 (79.9)
<i>Reason for absenteeism</i>	
Short-term illness	19 (24.7)
Long-term illness	4 (5.2)
Personal or emotional problem	4 (5.2)
Injury	30 (39.0)
Dental issue	4 (5.2)
Other	16 (20.8)

Table 2. Medical evacuation in offshore workers

Measure	N (%)
<i>Required medical evacuation</i>	
Yes	42 (12.1)
No	305 (87.9)
<i>Required emergency medical evacuation</i>	
Yes	14 (34.1)
No	27 (65.9)
<i>Number of times in career received medical evacuation</i>	
1	34 (85.0)
2	4 (10.0)
3	0 (0)
4	1 (2.5)
5-9	0 (0)
≥10	1 (2.5)
<i>Reason for medical evacuation</i>	
Short-term illness	14 (31.8)

Long-term illness	0 (0)
Personal or emotional problem	2 (4.5)
Injury	15 (34.1)
Dental issue	5 (11.4)
Other	8 (18.2)